

CLAIMS:

1. A cache control method for an information processing system having a data processing apparatus, a control unit for a cache memory, and a storage unit for storing a record, respectively interconnected together, wherein said control unit

(a) receives from said data processing apparatus a write request for a record to be written;

(b) receives a data to be written in said object record from said data processing apparatus, if said record to be written is not being stored in said cache memory;

(c) stores said the received data in said cache memory;

(d) notifies said data processing apparatus of a completion of a data write process;

(e) checks whether said object record in which said data stored in said cache memory is to be written is being stored in said storage unit or not;

(f) if said record is being stored, writes said data stored in said cache memory in said object record of said storage unit, and if not, said data stored in said cache memory is not written and such effect is notified to said data processing apparatus.

2. A cache control method for an information processing system having a data processing apparatus, a control unit for a cache memory, and a storage unit for storing a record having a control field inclusive of a

record number, respectively interconnected together, wherein said control unit comprises the steps of:

(a) receiving from said data processing apparatus a write request including record appointed information for appointing a record to be written, field appointed information for appointing a field to be written in the record, and process mode appointed information for appointing a process mode to be executed when said record to be written is not being stored in said cache memory;

(b) if the record to be written and appointed by said record appointed information is not being stored in said cache memory and if the field to be written and appointed by said field appointed information does not contain the control field, then receiving from said data processing apparatus a data to be written in said appointed field in accordance with said process mode appointed by said process appointed information;

(c) storing said data in said cache memory;
and

(d) notifying said data processing apparatus of a completion of a write process.

3. A cache control method for an information processing system having a data processing apparatus, a control unit for a cache memory, and a storage unit having a plurality of physical areas for storing a record having a control field inclusive of a record number, respectively interconnected together, wherein

said control unit holds, for each physical area, structural condition information representative of if a structural condition that there is no duplicate record number of the record in the physical area, is satisfied or not, and comprises the steps of:

(a) receiving from said data processing apparatus a write request including record appointed information for appointing a record to be written, and field appointed information for appointing a field to be written in the record;

(b) if the record to be written and appointed by said record appointed information is not being stored in said cache memory, if the field to be written and appointed by said field appointed information does not contain the control field, and if the structural condition is satisfied, then receiving from said data processing apparatus a data to be written in said appointed field in accordance with said process mode appointed by said process appointed information;

(c) storing said data in said cache memory;
and

(d) notifying said data processing apparatus of a completion of a write process.

4. A cache control method according to claim 2, wherein said control unit comprises the steps of:

after receiving said data from said data processing apparatus and storing said data in said cache memory;

(e) finding from said storage unit said record to be written;

(f) if said record to be written is found, writing said data stored in said cache memory in said found record, and if said record to be written is not found, not writing said data stored in said cache memory and notifying said data processing apparatus of such effect.

5. A cache control method according to claim 4, wherein said control field contains information representative of the length of a field other than said control field;

at said step (c), said data is stored in said cache memory and the length of said data is stored;

at said step (f), said information representative of the length of a field other than said control field of said found record is compared with said data length stored at said step (c), if both said lengths are coincident, said data stored in said cache memory is written in said found record, and if both said lengths are not coincident, said data stored in said cache memory is not written but such effect is notified to said data processing apparatus.

6. A cache control method according to claim 3, wherein said control unit further comprises a step of:

(i) if the field to be written and appointed by said field appointed information does not contain said control field, and if said structural condition

information for the physical area storing said record to be written indicates a state that it is not certain whether said condition is satisfied or not, then checking if said physical area satisfies said condition and holding said check result as new structural condition information.

7. A cache control method according to claim 6, wherein said control unit further comprises a step of:

(j) if the field to be written and appointed by said field appointed information does not contain said control field, holding, as said structural condition information for said physical area storing said record to be written, a state that it is not certain if said physical area satisfies said condition.

8. A cache control method for an information processing system having a data processing apparatus, a control unit for a cache memory, and a storage unit having a plurality of physical areas for storing a record having a control field inclusive of a record number, respectively interconnected together, wherein said control unit comprises the steps of:

(a) receiving from said data processing apparatus a write request including record appointed information for appointing a record to be written, field appointed information for appointing a field to be written in the record, and structural condition information representative of if a structural condition

that record number of the record at the start of the physical area for storing records is "0" and the numbers of following records are given in the ascending order each incremented by "1", each record has one field other than said control field, the length of the field other than said control field of each record having the record number 1 or larger is the same, and the field other than said control field of the record having the record number 0 has a predetermined length, is satisfied or not;

(b) if the record to be written and appointed by said record appointed information is not being stored in said cache memory, if the field to be written and appointed by said field appointed information does not contain said control field, and if said structural condition is satisfied, then receiving from said data processing apparatus a data to be written in the appointed field;

(c) storing said data in said memory; and

(d) notifying said data processing apparatus of a completion of a write process.

9. A cache control method for an information processing system having a data processing apparatus, a control unit for a cache memory, and a storage unit having a plurality of physical areas for storing a record having a control field inclusive of a record number, respectively interconnected together, wherein said control unit holds, for each physical area,

structural condition information representative of if a structural condition that the record number of the record at the start of the physical area for storing records is "0" and the numbers of following records are given in the ascending order each incremented by "1", each record has one field other than said control field, the length of the field other than said control field of each record having the record number 1 or larger is the same, and the field other than said control field of the record having the record number 0 has a predetermined length, is satisfied or not, and comprises the steps of:

(a) receiving from said data processing apparatus a write request including record appointed information for appointing a record to be written, and field appointed information for appointing a field to be written in the record;

(b) if the record to be written and appointed by said record appointed information is not being stored in said cache memory, if the field to be written and appointed by said field appointed information does not contain said control field, and if the structural condition is satisfied, then receiving from said data processing apparatus a data to be written in the appointed field;

(c) storing said data in said cache memory;
and

(d) notifying said data processing apparatus of a completion of a write process.

10. A cache control method according to claim 8, wherein said control unit comprises the steps of:

after receiving said data from said data processing apparatus and storing said data in said cache memory;

(e) finding from said storage unit said record to be written;

(f) if said record to be written is found, writing said data stored in said cache memory in said found record, and if said record to be written is not found, not writing said data stored in said cache memory and notifying said data processing apparatus of such effect.

11. A cache control method according to claim 10, wherein said control field contains information representative of the length of a field other than said control field;

at said step (c), said data is stored in said cache memory and the length of said data is stored;

at said step (f), said information representative of the length of a field other than said control field of said found record is compared with said data length stored at said step (c), if both said lengths are coincident, said data stored in said cache memory is written in said found record, and if both said lengths are not coincident, said data stored in said cache memory is not written but such effect is notified to said data processing apparatus.

12. A cache control method according to claim 10, further comprising a step of:

calculating before said step (f) a write position on said physical area of said record to be written, wherein

at said step (f), the write position on said area of said found record is compared with said calculated write position, if the comparison result satisfies a predetermined condition, said data stored in said cache memory is written in said found record, and if the comparison result does not satisfy said predetermined condition, said data stored in said cache memory is not written but such effect is notified to said data processing apparatus.

13. A cache control method according to claim 10, wherein

at said step (e), if there is a plurality of records to be written within the same physical area, the records to be written are found in the order of record number, and

at said step (f), said data stored in said cache memory is sequentially written in said found records in the order as found.

14. A cache control method according to claim 13, further comprising a step of:

calculating before said step (e) a write position on said physical area of each of a plurality of records to be written,

wherein

if the distance between the position of said found record to said calculated write position of said record to be next found is equal to or larger than a predetermined value, said step (e) of founding a record is temporarily intercepted.

15. A cache control method according to claim 8, wherein said control unit further comprises the steps of:

after receiving the data from said data processing apparatus and storing said data in said cache memory,

(e) calculating a write position on said physical area of the record to be written;

(f) finding the record to be written within a predetermined range near said calculated write position; and

(g) if the record to be written is found, said data stored in said cache memory is written in said found record, and if not, said data stored in said cache memory is not written but such effect is notified to said data processing apparatus.

16. A cache control method according to claim 8, wherein instead of said step (b), there is provided a step of:

(m) if said field to be written and appointed by said field appointed information does not contain said control field, if said cache memory stores therein

no record at the physical area storing a record to be written or stores therein a certain record having a record number smaller by 1 than that of said record to be written, and if said structural condition is satisfied at said step (a), then receiving the data to be written in said appointed field from said data processing apparatus.

17. A cache control method according to claim 9, wherein said control unit further comprises a step of:

(i) if the field to be written and appointed by said field appointed information does not contain said control field, and if said structural condition information for the physical area storing said record to be written indicates a state that it is not certain if said condition is satisfied, then checking if said physical area satisfies said condition and holding said check result as new structural condition information.

18. A cache control method according to claim 17, wherein said control unit further comprises a step of:

(j) if the field to be written and appointed by said field appointed information does not contain said control field, holding, as said structural condition information for said physical area storing said record to be written, a state that it is not certain if said physical area satisfies said condition.

19. A cache control apparatus having a cache memory connected between a data processing apparatus and a storage unit for storing a record, comprising:

(a) write request receiving means for receiving from said data processing apparatus a write request for a record to be written;

(b) data receiving means for receiving, if said record to be written is not being stored in said cache memory, a data to be written in said object record from said data processing apparatus;

(c) data storing means for storing said received data in said cache memory;

(d) write process completion notifying means for notifying said data processing apparatus of a completion of a data write process;

(e) record presence checking means for checking if said object record in which said data stored in said cache memory is to be stored is being stored in said storage unit;

(f) data writing means for writing said data stored in said cache memory in said object record of said storage unit if said record is being stored; and

(g) termination notifying means for not writing said data stored in said cache memory and notifying such effect to said data processing apparatus, if said record is not being stored.

20. A cache control apparatus having a cache memory connected between a data processing apparatus and a storage unit for storing a record having a control field inclusive of a record number, comprising:

(a) write request receiving means for receiving from said data processing apparatus a write request including record appointed information for appointing a record to be written, field appointed information for appointing a field to be written in the record, and process mode appointed information for appointing a process mode to be executed when said record to be written is not being stored in said cache memory;

(b) data receiving means for receiving, if the record to be written and appointed by said record appointed information is not being stored in said cache memory and if the field to be written and appointed by said field appointed information does not contain the control field, a data to be written in said appointed field from said data processing apparatus in accordance with said process mode appointed by said process appointed information;

(c) data storing means for storing said data in said cache memory; and

(d) write process completion notifying means for notifying said data processing apparatus of a completion of a write process.

21. A cache control apparatus having a cache memory connected between a data processing apparatus and a storage unit having a plurality of physical areas for storing a record having a control field inclusive of a record number, comprising:

(a) structural condition information holding means for holding, for each physical area, structural condition information representative of if a structural condition that there is no duplicate record number of the record in the physical area is satisfied or not;

(b) write request receiving means for receiving from said data processing apparatus a write request including record appointed information for appointing a record to be written, and field appointed information for appointing a field to be written in the record;

(c) data receiving means for receiving, if the record to be written and appointed by said record appointed information is not being stored in said cache memory, if the field to be written and appointed by said field appointed information does not contain the control field, and if the structural condition is satisfied, a data to be written in said appointed field from said data processing apparatus in accordance with said process mode appointed by said process appointed information;

(d) data storing means for storing said data in said cache memory; and

(e) write process completion notifying means for notifying said data processing apparatus of a completion of a write process.

22. A cache control apparatus according to claim 20, further comprising:

(f) record finding means for finding, after receiving said data from said data processing apparatus and storing said data in said cache memory, said record to be written from said storage unit;

(g) data writing means for writing said data stored in said cache memory in said found record, if said record to be written is found; and

(h) termination notifying means for not writing said data stored in said cache memory and notifying said data processing apparatus of such effect, if said record to be written is no found.

23. A cache control apparatus having a cache memory connected between a data processing apparatus and a storage unit having a plurality of physical areas for storing a record having a control field inclusive of a record number, comprising:

(a) write request receiving means for receiving from said data processing apparatus a write request including record appointed information for appointing a record to be written, field appointed information for appointing a field to be written in the record, and structural condition information representative of if a structural condition that record number of the record at the start of the physical area for storing records is "0" and the numbers of following records are given in the ascending order each incremented by "1", each record has one field other than said control field, the length of the field

other than said control field of each record having the record number 1 or larger is the same, and the field other than said control field of the record having the record number 0 has a predetermined length, is satisfied or not;

(b) data receiving means for receiving, if the record to be written and appointed by said record appointed information is not being stored in said cache memory, if the field to be written and appointed by said field appointed information does not contain said control field, and if said structural condition is satisfied, a data to be written in the appointed field from said data processing apparatus;

(c) data storing means for storing said data in said memory;
and

(d) write process completion notifying means for notifying said data processing apparatus of a completion of a write process.

24. A cache control apparatus having a cache memory connected between a data processing apparatus and a storage unit having a plurality of physical areas for storing a record having a control field inclusive of a record number, comprising:

(a) structural condition information holding means for holding, for each physical area, structural condition information representative of if a structural condition that the record number of the record at the

start of the physical area for storing records is "0" and the numbers of following records are given in the ascending order each incremented by "1", each record has one field other than said control field, the length of the field other than said control field of each record having the record number 1 or larger is the same, and the field other than said control field of the record having the record number 0 has a predetermined length, is satisfied or not;

(b) write request receiving means for receiving from said data processing apparatus a write request including record appointed information for appointing a record to be written, and field appointed information for appointing a field to be written in the record;

(c) data receiving means for receiving, if the record to be written and appointed by said record appointed information is not being stored in said cache memory, if the field to be written and appointed by said field appointed information does not contain said control field, and if the structural condition is satisfied, a data to be written in the appointed field from said data processing apparatus;

(d) data storing means for storing said data in said cache memory; and

(e) write process completion notifying means for notifying said data processing apparatus of a completion of a write process.

25. A cache control apparatus according to claim 23, further comprising:

(f) write position calculating means for calculating a write position on said physical area of the record to be written;

(g) position comparing means for comparing the write position on said physical area of said found record with said calculated write position;

(h) data writing means for writing, if the comparison result satisfies a predetermined condition, said data stored in said cache memory in said found record; and

(i) termination notifying means for not writing, if the comparison result does not satisfy said predetermined condition, said data stored in said cache memory but notifying such effect to said data processing apparatus.

26. A cache control apparatus according to claim 23, further comprising:

(f) write position calculating means for calculating a write position on said physical area of the record to be written;

(g) record finding means for finding a record to be written within a predetermined range near said calculated write position;

(h) data writing means for writing, if the record to be written is found, said data stored in said cache memory in said found record; and

(i) termination notifying means for not writing, if the record to be written is not found, said data stored in said cache memory but notifying such effect to said data processing apparatus.